Original article

Effect of perceived self - efficacy promoting and chair yoga program on pain in patients with knee osteoarthritis

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Abstract

Background: Osteoarthritis (OA) is a chronic degenerative condition of the knee joint. Patients' health is disturbed by physical symptoms such as pain and stiffness. Knee OA is likely to engage in an active lifestyle. Developing patient's belief that he/she is able to manage the symptoms and can function normally is an essential goal. Patient perceives self-efficacy has a strong influence on the adoption of new health behaviors, because it directs individual's beliefs, goals, and actions.

Objective: To determine the effect of perceived self-efficacy promoting and chair yoga program on pain in patients with knee OA.

Methods: A quasi-experimental study, knee OA patients were randomly allocated into two groups. The experimental group performed self – efficacy promoting and chair yoga program consisted of 60 minutes/time, 3 times a week for 8 weeks whereas, the control group received conventional nursing care. Pain score was measured by Knee and Osteoarthritis Outcome Score scale and arthritis self – efficacy was measured perceived self-efficacy. Descriptive statistics, Wilcoxon Signed Rank Test, and Mann - Whitney U test were analyzed.

Results: The mean score of pain in patients with knee OA after receiving the program was significantly lower than that before receiving the program, and also lower than that the control group at the significant level ($P < 0.05$)

Conclusion: Chair yoga can reduce pain and improve functional performance. These findings support the recommendations of perceived self - efficacy promoting and chair yoga program in patients with knee OA.

Keywords: Chair yoga, knee osteoarthritis, pain, self-efficacy promoting.

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Osteoarthritis (OA) is the most common musculoskeletal, a leading cause of pain, functional limitation, and disability. Currently, an estimated 40 million and will be increase to 57 million in 2020 in the worldwide. Osteoarthritis (OA) prevalence was higher among women (25.4%) compared with men (17.6%), older age groups (50.0% for persons aged > 65 years and 29.3% for persons aged 45 - 64 years) compared with younger age groups (7.9% for persons aged 18 - 44 years). The most commonly affected joints are the knees.[1] Symptomatic knee OA is associated with varying degrees of functional limitation, insomnia, and reduced quality of life. Because OA is a progressive and chronic degenerative condition that is highly prevalent, the health care utilization and costs for treatment are substantial. The total annual cost for medical treatments alone is estimated to be $81 billion in the USA.[1 - 2] Physicians and other health care professionals recommend targeting three areas to manage arthritis: weight management for overweight and obese patients, physical activity counseling, and pain-management education. As for adults with OA, exercise has proved to be the most effective non-drug treatment for reducing pain and improving function, movement, mood, and quality of life. Therapeutic exercise, such as simple activities like walking, are recommended for treatment and prevention the progression of OA. In the currently, complementary, and alternative medicine (CAM) may be an innovative and more effective method for improving OA symptoms.[3] Yoga, Tai Chi Chuan, and Qigong are a few types of exercises that are ideal for older adults with OA, because they have low impact, strength training exercises the most recommended options for the treatment.[3] The incidence of OA increases with age and will represent an increasingly significant problem for the aging population. In recent years, yoga has also been used as an effective treatment for OA. Yoga practice is the union of mind and spirit and brings balance to the body and promotes healing. A number of randomized controlled studies have shown that participation in yoga significantly improve pain flexibility, strength, balance, and gait in healthy.[4] *Asanas* or yoga poses not only tone the muscles, tissues, ligaments, joints, and nerves, but also maintain the smooth functioning and health of all body's systems. They relax the body and mind, allowing both to recover from fatigue or weakness, and the stress of daily life. *Asanas* also boost metabolism, lymphatic circulation, and hormonal secretion and bring about a chemical balance in the body.[4 – 10]

Chair yoga this type of yoga that uses chair for assistive devices to support parts of the body while performing the *asanas*. Chair yoga is an isometric exercise is a static contraction of a muscle, where the muscle is contracted, but the muscle does not change in length. Yoga has a beneficial impact on the whole body, and it is an isometric exercise. Studies have shown that isometric muscle contraction recruits more motor units (motor neuron and the skeletal muscle it innervates) than both eccentric and concentric contractions. Isometrics activated 95.2% of the motor units while eccentric and concentric contractions stimulated 88.3% and 89.7% respectively. It is important to understand, that isometric training only provides strength gains at the joint angles being worked. Although some view this as a limitation of isometric training, it can also provide an efficient way to strengthen a desired movement pattern at a specific range of motion. [11 - 14]

How to maintain behavior? A significant determinant of health behavior is self-efficacy, or the individual's belief that can be successfully complete a goal or behavior to achieve a desired outcome. Self-efficacy has a strong influence on the adoption of new health behaviors, because it directs individuals' goals and actions.[15 - 20]

Materials and methods

Subjects

This research is a quasi-experimental research. Subject number was calculated using Numerical rating scale (NRS) rating on pain 3 - 6 point in adult patients with knee OA, a total of 54 subjects (27 for each group). The study assesses recruited from the Out Patients Department of Orthopedics at the King Chulalongkorn Memorial Hospital, Bangkok, Thailand.

Inclusion criteria consisted of: 1) diagnosed as adult with knee OA on pain scores 3 - 6 point by Numerical rating scale (NRS) assessments; 2) having no serious underlying such as neurological and cardiovascular disease; 3) accepted to participate in the program; 4) Thai language communication; and, 5) being available through mobile phone connection. Exclusion criteria included; severe pain and inflammation on the knee. All subjects were informed of the experimental protocol and possible risks involved. They were informed verbally and in writing before signing their consent form after receiving the data of experiment.

This study has been certified by the Institutional Review Board (IRB) of the Faculty of Medicine, Chulalongkorn University. (COA no. 269/2020 IRB no.776/62)

Outcome measurement

Demographic data record included gender, age, educational level, and the physical measurements consisting of height, body weight, body mass index. The knee injury and osteoarthritis outcome score (KOOS) is self-administered with sections addressing pain of (9 items). And osteoarthritis self-efficacy (8 items) that ask how certain respondents are that they can perform the tasks listed about pain, other symptoms, and function. They are a Likert scale to measure 0 (uncertain) to 4 (very certain).

Exercise intervention

At the beginning of the study, all subjects were provided with an information brochure and VDO that included details about chair yoga exercise and arthritis knowledge. Chair yoga program was requested to all subjects to practice at home for 1 hour, three times a week, for 8 weeks. Chair yoga was applies by Hatha yoga poses are the most basic yoga.[11] Classes began with a gentle warm-up and breathing exercises, or a meditation with 5 minute long, and continued with practice of specific movements, ending with a meditation to cool-down. Throughout the intervention, the researcher focused on correcting imbalances in muscles affecting spinal alignment and posture while performing the poses. The practice session ended with a 5 minute relaxation using meditation poses on the chair. At the end of the class, participants were encouraged to continue chair yoga therapy at home, and were provided with a chair yoga home practice sheet with pictures, VDO, and written instructions on the poses they practiced during the program. The subjects were evaluated after the completion of the chair yoga intervention on the same variables at pre-intervention at the last session of brochure.

Chair yoga consisted of 8 poses

The first: Chair Savasava, the subject is to sit on the chair the eyes closed, hands on the legs, and to take a deep breathing for 5 minutes.

The second: Wide-Legged Camel to Forward Fold pose: the subject is to sit toward the front of the chair, separate legs about the width of shoulders, hold the chair at the backward, inhale and ben body backward, hold on up to 30 seconds, exhale and move to the center, and repeat this 10 times; then sit in the same position inhale and clasp the hand at the back, exhale and ben forward to the knees, hold on up to 30 seconds and repeat this10 times.

The third: Seated Spinal Twist pose, the subject is to sit toward the front of the chair with knees bent and directly above ankles, then press through the feet and feel the spine lengthen, inhale and bringing the arms wide and overhead, then exhale and twist to the right, place the left hand on the outer right thigh and the right hand on the seat, then lift the chest and widen the collarbones, hold for three full breaths, then return to center, inhale, then exhale and switch sides, and repeat this 10 times.

The forth: Wide-Legged Downward-Facing Dog pose: the subject is to stand in front of the chair, inhale and bringing the hands to the chair seat, then step both feet back and bring them wide, then press through the feet and bend the knees (do not let them go past the toes), fully extend the spine, keep the spine long, and slowly straighten the legs and gaze between the feet and hold on up to 30 seconds, then step the feet in and walk forward, inhale, raising slowly and bringing arms wide, ending with palms together overhead, exhale, bringing the hands to the heart in prayer position.

The fifth: The subject is to revolve the side angle stand in front of the chair, inhale bring the arms wide and overhead, then exhale, extend the arms wide, bring the hands to the chair seat, then step the left foot back, extended them strongly through the heel, then bend the right knee so that it is directly above the ankle and draw the inner thighs toward each other. Body should then form a straight, diagonal line from the head to back heel, the subject is to place the left forearm on the chair seat, lift the chest as extend the right arm behind, press gently through the left forearm to rotate a bit further, and hold on up to 30 seconds; then to release the hands back to the chair, step forward, inhale and raise the arms wide and overhead, then repeat on the opposite side and repeat this 10 times a pose.

The sixth: Extended Side Angle: The subject is to stand facing the front of the chair, inhale, bring the arms wide and overhead, then exhale, extend the arms wide, bring the hands down to the chair seat. Then the subject is to step the right foot back, angling it outward, bend the left knee, keeping it directly over the ankle and aimed toward, draw the left sitting bone

inward and extend the right arm behind palm upward, then rotate the body to the right, then reach the arm overhead, extend from the heel to fingertips; then draw left forearm back lightly on the chair to lift the chest while press down through both feet, lifting up through the side waist; hold for three full breaths, then windmill the right arm back to the chair, spin on the ball of the right foot, and bring the hips square to the front, step forward, inhale as raising arms wide and overhead, then repeat on the opposite side, repeat this 10 times a pose.

The seventh: Crescent Lunge: The subject is to stand facing the back of the chair, inhale, bring the arms wide and overhead; then exhale, turning the arms wide, bring the hands down to the chair back; then step the left foot back, lengthen it through the heel; bend the right knee, keeping it directly above the ankle; the hipbones should be facing front. The subject is to draw the inner thighs toward each other like magnets, and lift the chest as extending the right arm overhead (as shown). The subject is to hold for three full breaths, then step forward, inhale to raise the arms wide and overhead, and repeat on the opposite side.

The eighth: Chair Post: The subject is to stand facing the back of the chair, inhale, bringing arms wide and overhead, then exhale, arms wide, bringing hands down to the chair back; inhale, then then exhale and bend both knees forward normal breathing, hold on up to 30 seconds, inhale and slowly stand.

Figure 1. The pattern of chair yoga post

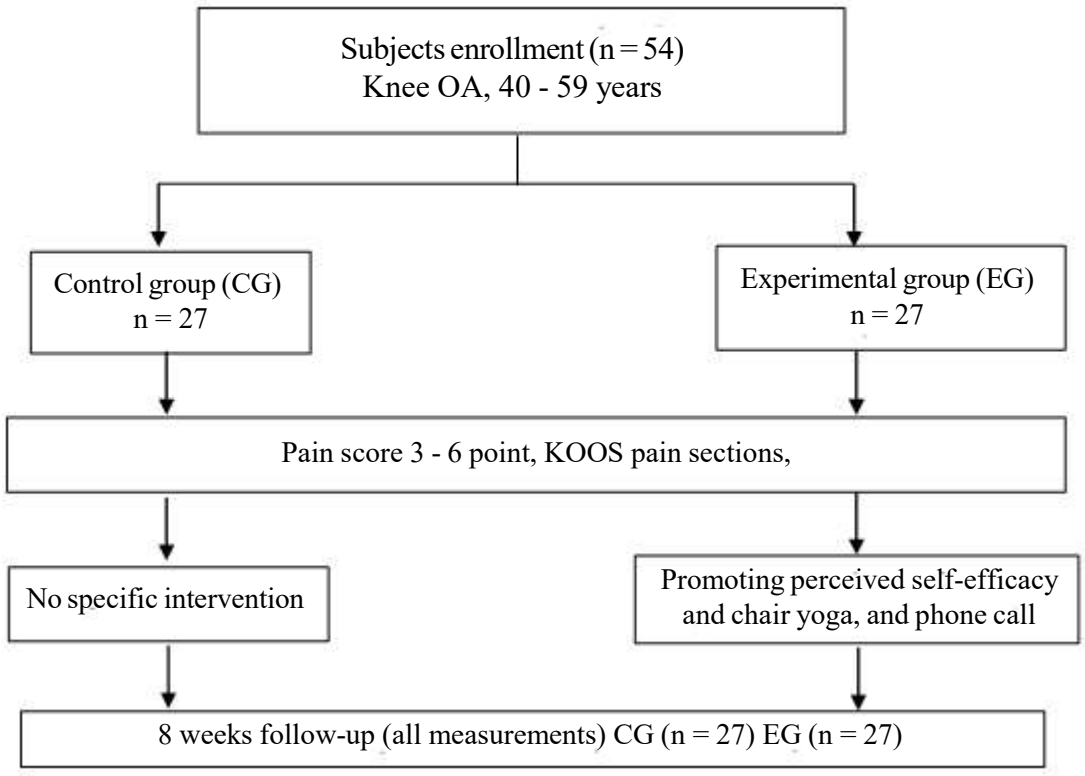

Figure 2. Overview of study methodology and flow of subjects through the study.

Statistical analysis

The data analyses were executed using the SPSS program (version 22.0). Descriptive statistics means, standard deviations (SD), and median were applied to explain baseline demographics study. Pain score was analyzed by Wilcoxon Signed Rank Test to compare in each group, and Mann - Whitney U was applied to compare between group. The level of significance was set up at $P < 0.05$.

Results

Subjects

Fifty-four females subjects were recruited in this study; they were divided into two groups: the first was the control group (CG) with 27 of the subjects. The second group was the experimental group; they received chair yoga exercise (EG) with 27 volunteers.

Baseline characteristics

Subjects in both groups are female knee OA patients. The mean age of 55.57 (SD = 3.75) for the control group, with mean age of 55.17 (SD = 2.40) for the experiment group. The educational levels were the primary education in both groups (37.0% and 29.6%). More than 50.0% of subjects had knee pain (the control group = 55.6% and the experimental group = 51.9%). In both groups had normal BMI (the control group = 48.1% and the experimental group = 37.0%)

Outcome variables

At the end of the intervention, the median of pain score in the experimental group was found decrease from 10 to 3 and there was statistically significant compared from before ($P < 0.05$). Also in the control, the median of pain score was found decrease from 15 to 9 and significantly compare from before ($P < 0.05$) (Table 1).

When comparing between both groups, the results found that the mean rank of pain score in the experimental group after receiving the program was significantly lower than that in the control group at the significant level a 0.05 (Table 2).

Table 1. Compared pain score in control group and experimental group before and after program by Wilcoxon Signed Rank Test.

Pain score	Median	Mean Rank	Z	*P* - value
Control group				
Before	15	12.50[a]		
			-4.291*	0.001
After	9	0		
Experimental group				
Before	10	12.50[a]		
			-4.293*	0.001
After	3	0		

[a]Based on Negative Ranks = pain score after < pain score before in experimental group
*$P < 0.05$

Table 2. Descriptive statistics of the sample at baseline and 8 weeks follow up (n = 54). To compared pain score between control group and experimental group before and after program by Mann - Whitney U Test.

Variable	Median	MeanRank	Z	*P* - value
Before experimental				
Control group	15	31.94		
			-2.080*	0.038
Experimental group	10	23.06		
After experimental				
Control group	9	34.76		
			-3.404*	0.001
Experimental group	3	20.24		

*$P < 0.05$

Pain was measured with the Pain subscale of the Knee Injury and Osteoarthritis Outcome Score. Scores range from 0 (no pain) to 4 (extreme pain).

Discussion

The aim of this study was to investigate the effects of perceived self - efficacy promoting and chair yoga program on pain among patients with OA knee. The mean age of control group is 55.2 ± 3.2 years and experimental group is 55.7 ± 2.4 years. The main outcome was reduced pain in osteoarthritis knee pre and post-test measurements were performed at 0 and 8 weeks. Volunteer groups were diagnosed with osteoarthritis knee pain score 3 - 6 point. The main outcome was measured with the pain subscale of the knee injury and osteoarthritis outcome score. The frequency of receiving program takes 60 minutes, exercise 3 times a week for 8 weeks.

After the end of 8 weeks, the study found that pain performance was statistically significant differences for compared within group and between groups.

Previous studies related to the use of yoga or exercise and self-efficacy for OA knee [12], which is consistent with other studies carried out with middle-aged adults and elderly adults with OA who practiced Hatha yoga.[7], this suggests chair yoga and Hatha yoga are similar benefits to practiced. In adult patients with OA knee [8], this study was conducted to determine of Hatha yoga group and aerobic/ strengthening exercise programs in older adults. Hatha yoga had a significant improvement from baseline in perception of OA symptoms [20] found, as considering addressing a patient's self-efficacy, it is important to understand that self-efficacy for a specific task changes over time. When changes are made to a patient's exercise program, it would also be a beneficial time to re evaluate the patient's self efficacy. Just as monitoring and progressing of home exercise programs should be implemented throughout rehabilitation, reassessing patient self efficacy throughout treatment is also warranted[18] explained that self-efficacy can change life style modification and pain management education of women with OA and nurses on non pharmacological interventions as well as integration of these into nursing care is essential.

Conclusion

Chair yoga is use in term of therapy to reduce pain in adults with knees osteoarthritis, and promote muscle strange, mobility, and endurance. Chair yoga program is easy and safe because of have assistive chair to share loading force wide implement the exercise. Chair yoga poses were adaptive from basic yoga poses. They are great normal and easy pose can motivate for exercise can be used as a sustainable exercise. Finally chair yoga program and perceived self-efficacy promoting are appropriate for chronic pain in adult patients with knees osteoarthritis, and to be use in all age and other diseases such as low back pain or office syndrome, or for postoperative total knee arthroplasty exercise in the future and measure more variables. In this research, only female subjects were present. In additional the male subjects also have more strange muscle in the same age, the literature review founded more incident that yoga is useful and safe exercise for everyone, but they have to adaptive for health condition.

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Conflict of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the reference cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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